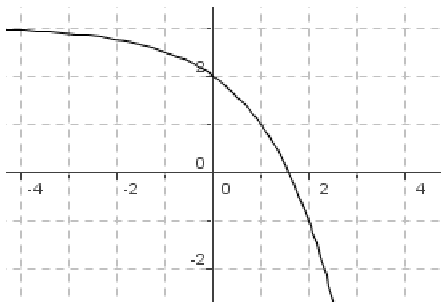
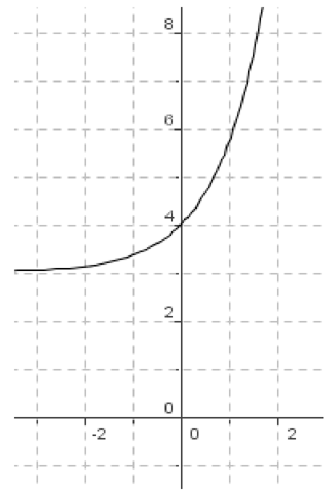
1. Sketch the graph of each function. State its domain and range:

a) $y = -2^x + 3$



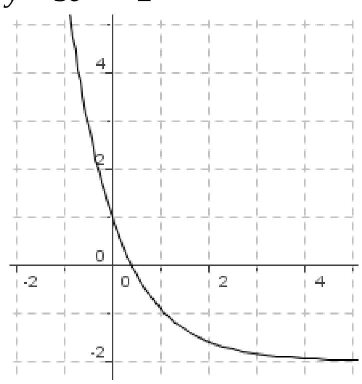
D: $(-\infty, \infty)$ R: $(-\infty, 3)$

b) $y = e^x + 3$



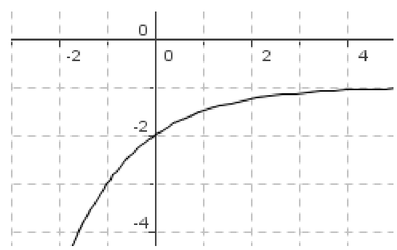
D: $(-\infty, \infty)$ R: $(3, \infty)$

c) $y = 3e^{-x} - 2$



D: $(-\infty, \infty)$ R: $(-2, \infty]$

d) $y = -2^{-x} - 1$



D: $(-\infty, \infty)$ R: $(-\infty, -1)$

2. Use a graphing calculator to find the zeros of each function (estimate to 3 decimal places):

a) $y = 2^x - 5$
x=2.322

b) $f(x) = e^x - 4$
x=1.386

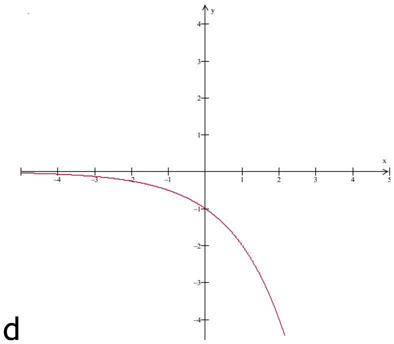
c) $y = 3^x - 0.5$
x=-0.631

d) $f(x) = 3 - 2^x$
x=1.585

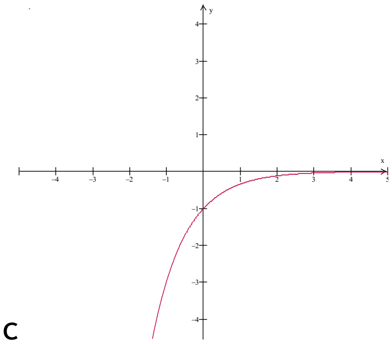
3. Match each function with its graph. Do it without using a graphing calculator.

a) $y = 2^x$ b) $y = 3^{-x}$ c) $y = -3^{-x}$

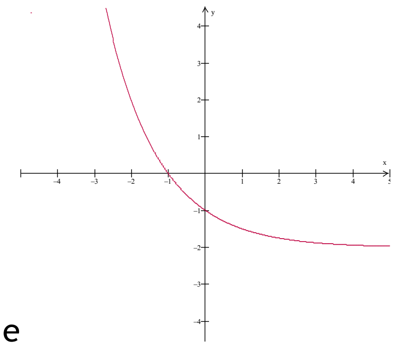
d) $y = -0.5^{-x}$ e) $y = 2^{-x} - 2$ f) $y = 1.5^x - 2$



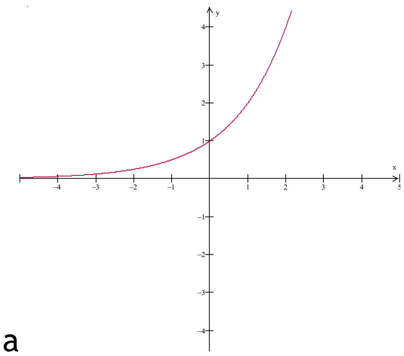
d



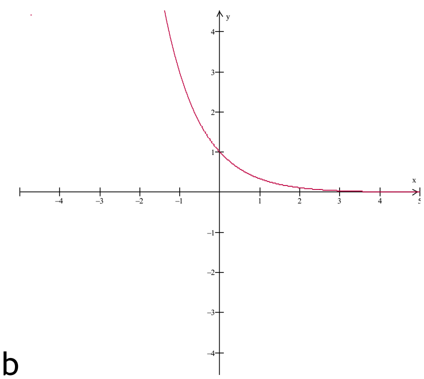
c



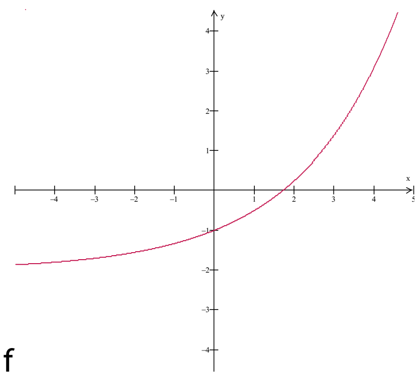
e



a



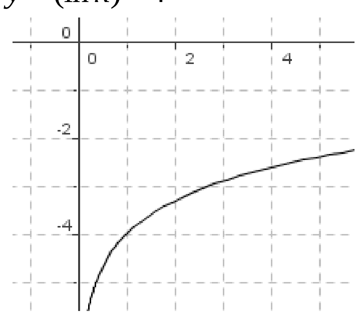
b



f

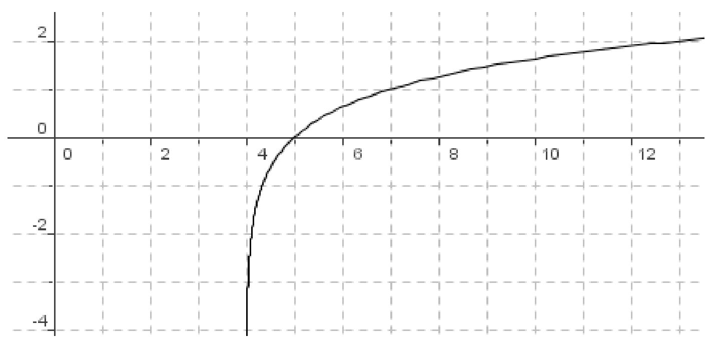
4. Sketch the graph of each function. State its domain and range:

a) $y = (\ln x) - 4$



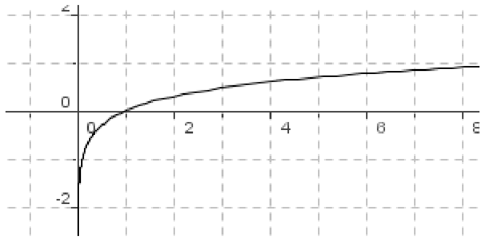
D: $(0, \infty)$ R: $(-\infty, \infty)$

b) $y = \log_3(x - 4)$



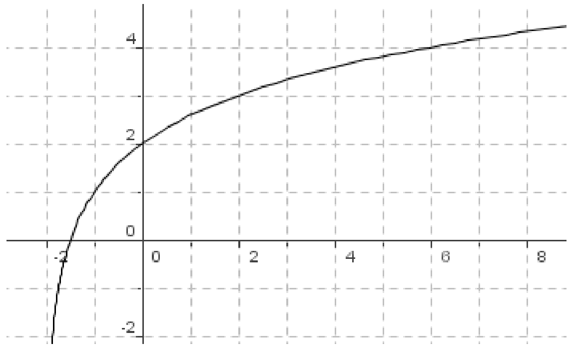
D: $(4, \infty)$ R: $(-\infty, \infty)$

c) $f(x) = \log x$



D: $(0, \infty)$ R: $(-\infty, \infty)$

d) $f(x) = 1 + \log_2(x+2)$



D: $(-2, \infty)$ R: $(-\infty, \infty)$

5. Solve algebraically:

a) $(1.045)^t = 2$

$$\ln\left[(1.045)^t\right] = \ln(2)$$

$$t \ln(1.045) = \ln(2)$$

$$t = \frac{\ln(1.045)}{\ln(2)} \approx 15.747$$

b) $e^{0.05t} = 3$

$$\ln(e^{0.05t}) = \ln(3)$$

$$0.05t = \ln(3)$$

$$t = \frac{\ln(3)}{0.05} \approx 21.972$$

c) $e^x + e^{-x} = 3$

Let $t = e^x$, then $t + t^{-1} = 3$

$$t + t^{-1} = 3 \quad \Rightarrow \quad t + \frac{1}{t} = 3$$

$$\Rightarrow \quad \frac{t^2+1}{t} = 3 \Rightarrow t^2 + 1 = 3t$$

$$\Rightarrow t^2 - 3t + 1 = 0 \Rightarrow t = \frac{3 \pm \sqrt{5}}{2}$$

but $t = e^x$ *so*

$$e^x = \frac{3 \pm \sqrt{5}}{2}$$

$$x = \ln\left(\frac{3 \pm \sqrt{5}}{2}\right) \approx \pm 0.962$$

d) $2^x + 2^{-x} = 5$

Let $t = 2^x$, then $t + t^{-1} = 5$

$$t + t^{-1} = 5 \quad \Rightarrow \quad t + \frac{1}{t} = 5$$

$$\Rightarrow \quad \frac{t^2+1}{t} = 5 \Rightarrow t^2 + 1 = 5t$$

$$\Rightarrow t^2 - 5t + 1 = 0 \Rightarrow t = \frac{5 \pm \sqrt{21}}{2}$$

but $t = 2^x$ *so*

$$2^x = \frac{5 \pm \sqrt{21}}{2}$$

$$x = \log_2\left(\frac{5 \pm \sqrt{21}}{2}\right) = \frac{\ln\left(\frac{5 \pm \sqrt{21}}{2}\right)}{\ln 2} \approx \pm 2.260$$

6. Find the inverse function of each of these functions:

a) $f(x)=10^x$

$$\log\left[f(x)\right]=\log(10^x)$$
$$\log\left[f(x)\right]=x$$
$$f^{-1}(x)=\log x$$

b) $y=e^x$

$$\ln\left[f(x)\right]=\ln(e^x)$$
$$\ln\left[f(x)\right]=x$$
$$f^{-1}(x)=\ln x$$

c) $y=\ln x$

$$e^y=e^{\ln x}$$
$$e^y=x$$
$$f^{-1}(x)=e^x$$

d) $f(x)=\log_2 x$

$$2^{f(x)}=2^{\log_2 x}$$
$$2^{f(x)}=x$$
$$f^{-1}(x)=\log_2 x$$